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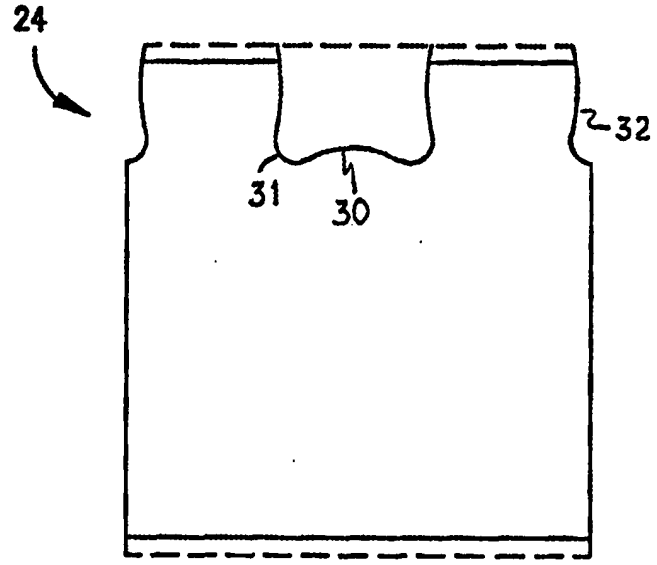
(57) Abstract

A roll of handled plastic bags is formed from a continuous collapsed tube. Each bag is bounded by two longitudinally spaced heat seals and is separable from the roll along perforated lines. The bag handles (32) and bag mouth (30) are formed by die cutting the tube. Improved separation of film layers is achieved by perforating a minor bag mouth edge portion centrally located between the opposing major inside smooth edge portions and tearing scrap thermoplastic film from the die-cut bag mouth to provide a rough edge having a series of torn film edge discontinuities which facilitate separation of blocked adjacent film layers during opening of the bag mouth.



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DIE-CUT THERMOPLASTIC BAG WITH EASY OPEN MOUTH

FIELD OF THE INVENTION

This invention relates to flexible thermoplastic handled sacks, such as bag products dispensed from a roll pack, and a method for separating a blocked, die-cut film bag mouth to provide easy opening.

BACKGROUND OF THE INVENTION

Handled thermoplastic sacks are well known and find increasing use as grocery sacks, refuse bags and the like. A common type of thermoplastic handled grocery sack is one made from a gusseted tube sealed at the top and the bottom with a suitable bag mouth and handle cutout, which yields a double layer of film in the handled region.

U.S. Patent No. 4,562,925 (Pistner), incorporated by reference, discloses a conventional thermoplastic bag structure comprising a front and rear bag wall, a bottom and an open mouth top portion, the open mouth portion being characterized by having two pairs of single film handle loops each of which are located at opposite ends of the open mouth portion, the handles of each pair being side-by-side and each handle is an integral single film loop extension of the front and rear bag walls. The bag structures can be unitized by providing a detachable tab at the bag mouth opening and unitizing the bag structures through this tab. The method of forming the bags involves providing an end sealed collapsed thermoplastic film tube and removing plastic to form a bag mouth opening and handles at one end thereof. The resulting bag is an ungusseted bag which can be unitized into a pack by providing a detachable, unitizing tab at the bag mouth opening.

U.S. Patent No. 4,790,437 (Pistner), incorporated by reference, teaches a method for forming a thermoplastic film handled bag comprising: forming a continuous collapsed thermoplastic tube having heat seal lines across the width of the tube at bag length intervals, longitudinally folding opposite sides of the heat sealed tube equally towards each other until they meet at a common center line, folding the structure once again in the same direction along the center line and removing eight film layers in one of the corner regions defined by a heat seal line and the spine of the common center line fold, the film removal yielding a bag mouth opening and single loop handles at near the opposite ends of the bag mouth opening. Interconnected bags can be formed into a roll pack.

In US Patent 4,846,349 (Galimberti), incorporated by reference, a method is shown for producing bags on a continuous roll, starting with collapsed tubular film material. The production method provides for forming longitudinal folds with transverse welds forming top and bottom bag lines. A die cuts multiple layers of plastic film to create handle and mouth portions, and waste material is removed from the die-cut plastic.

Such roll packs are commonly employed in dispensing thin film plastic bags, usually by including a transverse line of weakened material, such as by perforating the roll or web between individual bags. It has been found, however, that adjacent film layers of typical die-cut bags are difficult to separate. Although die-cut polyolefin film can be fabricated into handled bags at line speeds greater than 150 cycles per minute using conventional smooth die cutting, this operation tends to block the individual film layers together, rendering the bag mouth difficult to open manually. Non-blocking film cutting techniques, such as reciprocal serrating, are significantly slower than die cutting.

Summary of the Invention

The present invention is directed to an improvement in handled thermoplastic bag manufacture, wherein the bag is formed by die cutting a multiple film bag structure to form a central mouth portion and integral handles at lateral portions of a collapsed tubular film. Opening of the bag mouth is facilitated by providing a central mouth portion with roughened edges to obviate film blocking.

In the preferred embodiment, an improved roll of flexible thermoplastic bags is provided for dispensing handled film bags. The product is made from a rolled collapsed tube web having a series of individual bottom-sealed bags joined top-to-bottom by a transverse perforated tear line of film disposed between the bottom bag seal and a pair of lateral loop handles disposed on opposite sides of a U-shaped bag mouth.

The improvement comprises an easy-open bag mouth having opposing major inside edge portions die-cut from adjacent bag walls formed by the collapsed tube of thermoplastic film and forming the inside edges of the lateral handles; and a minor bag mouth edge portion centrally located between the opposing major edge portions, said minor bag mouth edge portion comprising a torn perforation line formed by tearing scrap thermoplastic film from the die-cut bag mouth. This technique provides a series of torn film edge discontinuities in the perforated minor bag mouth edge portion to facilitate separation of blocked adjacent film layers during opening of the bag mouth.

Advantageously, the collapsed tube is produced by extruding a polymeric material , such as low density polyethylene, high density polyethylene (HDPE), linear low density polyethylene (LLDPE) and blends thereof.

Brief Description of the Drawings

Reference is made to the following detailed description of exemplary embodiments of a layflat plastic bag with integral handles in accordance with the present invention, taken in conjunction with the accompanying drawings; in which:

Fig. 1 is a plan view of a collapsed thermoplastic tube;

Fig. 2 is a plan view of the sealed tube of Fig. 1 with opposite sides folded equally inwardly;

Fig. 3 is a plan view of the folded sealed tube of Fig. 2 having cut out portions to produce bag mouth regions and integral bag handles for a plurality of bags;

Fig. 4 is a plan view of the folded sealed tube having cut out portions to produce bag mouth and integral bag handles of Fig. 3 with opposite sides folded equally inwardly;

Fig. 5 presents the Fig. 4 embodiment in roll form;

Fig. 6 is a plan view of a single detached bag fully unfolded to show the handles and bag mouth regions of a bag; and

Fig. 7 is an enlarged view of a portion of the bag mouth.

Detailed Description of the Invention

It is well known in the plastics art to continuously melt extrude thermoplastic resin through an annular orifice, apply internal fluid pressure to the tube thus extruded and thereby expand the tube and reduce the wall thickness thereof to appropriate dimensions while cooling and solidifying the extruded thermoplastic film. This technique and any equivalent technique of forming a thermoplastic film tube, can be employed in providing the starting material for the bags and bag packs of the present invention.

The contemplated thermoplastic film can be of any type having the characteristics necessary for a handled bag which will be required to carry items totaling up to about 45 lbs. or more. While not limited to the polyolefins, these materials have proven in the past to be excellent films from which bags can be made. Preferred materials include

polyethylene, generically and, specifically, low density polyethylene, high density polyethylene, including high molecular, high density polyethylene, linear low density ethylene copolymerized with a C_4-C_8 alpha olefin and blends and coextrusions of these materials. In addition, the polyethylenes can be blended with certain aromatic polymers in order to impart special desirable physical characteristics thereto. Linear low density polyethylene can be blended with up to about 10% by weight of polystyrene. Suitable examples of a commercially available polyolefin material suitable for use in the present invention include high density homopolymer polyethylene (HDPE) or linear low density polyethylene (LLPDE), which comprises ethylene copolymerized with from about 2 to about 7 wt. % of octene-1. The polyolefin is melt extruded through an annular orifice and blown up to a tube which will have a lay flat diameter of approximately 60 cm (24 inches) and single film thickness of about 10 to 20 microns (0.4-0.8 mil). This tube is then collapsed and formed into heat-sealed segments approximately 90 cm. (36 inches) long. This will produce what is known as a sealed "pillowcase" 10 as shown in Fig. 1. The sides 26 are seamless and the ends 12 are heat-sealed. Heat-seal 12 constitutes a thermal merging of the two films of the collapsed tube. The seals 12 can be made so that they simultaneously seal and sever through the films or the seals may be made not to sever through but merely weaken the region adjacent to line 12 so they may be subsequently severed with comparatively little force. As depicted in Fig. 1, another technique which is particularly preferred is to provide pairs of relatively closely spaced heat seals 12, the spacing generally on the order of about one-half to one inch between individual heat seals 12. Advantageously placed between the pairs of heat seals 12 is a transverse line of weakness or perforation line 14 effective to permit individual bags to be severed with relatively little force. This technique is

preferred because the next step of the method of the present invention requires that the seamless sides of the tube 26 be folded over in a continuous process, as shown at 16 of Fig. 2. The degree of foldover is related to the ultimate width of the desired handles. Employing a lay-flat tube having a side-to-side dimension of approximately 60 cm, the individual handle widths can range anywhere from about 10-20 cm, preferably from about 12-18 cm. When it is desired to produce a trash can liner product, the side-to-side dimension of the lay-flat tube will be approximately 75 cm (30 inches).

Referring now to Fig. 3, in forming the bags contemplated by the present invention, the side-folded, sealed and perforated structures, shown in Fig. 2, are serially provided with cut-out regions 18 by the use of a suitable cutting mechanism, the handles and bag mouth opening thus formed by the removal of plastic film from cut-out region 18. As may be appreciated by those skilled in the art, it is necessary, in order to create the carrying handles of the present invention, to open the upper left and right sides of the structures as at 32 (see Fig. 6). This is uniquely accomplished by having the side-folded regions 18 extend far enough into the cut-out region 18 for each bag. As shown, the cutting member which thus remove a hand-accommodating slice from each pillowcase structure to yield openings at 32. As with the portion removed from the region between the handles, this portion can be returned for recycle as usable resin material.

Referring again Fig. 3, it should be appreciated that a preferred embodiment of the present invention includes the use of a handle/bag mouth cutout of a more complex design. The handles and bag mouth opening show that at the base of the handles there are stress relief regions 28 which function to cause stress forces which ordinarily would be brought to bear along bag mouth line 30 to concentrate at points below this line. Thus, stress forces will literally extend through

the film space between the bottoms of the arcs of stress relief regions 28. As indicated above, the preferred handled bags of the present invention are relatively large bags.

Referring now to Figs. 4 and 5, in forming handle-containing bags in roll-form, such as is illustrated in Fig. 5, the marginal edges of the tube are once again folded inwardly toward each other to form folded regions 20. Then, the twice folded tube structure is convolutely winded to form severable bags on a roll 22.

As may be seen by reference to Fig. 6, a bag of the present structure makes maximum use of the potential volume of the original collapsed cylinder. The subsequent severing of an individual bag 24 and the unfolding of the folded over regions 20 (see Fig. 4) and 16 (see Fig. 2), ultimately yield the handled bag of the present invention. The die-cut mouth has a relatively short central portion having a discontinuous edge segment (see enlarged view Fig. 7) adapted for easy manual opening. The opposing handles 32 and side portions 31 of the bag mouth are preferably smooth die-cut.

The preferred large volume bags of the present invention will find utility in a wide variety of both home and industrial applications, including the disposal of leaves and yard refuse, garbage, debris, etc. Advantageously, upon being filled, the bag handles may be tied together to close the bag, eliminating the need for bag ties of the type typically employed. The ungusseted construction of the bag bottom provides excellent leak resistance.

In preferred embodiment of the invention, the handle portion of a bag. The handle seal is separated from the adjacent bottom seal by a transverse weakened portion formed as a linear series of uniform perforations having predetermined slit length and extending across the bag handles. At least one extended edge perforation or nick is cut in the perforation line at the handle edges for the purpose of initiating the tearing action.

Bags held together by perforations wound on a roll are dispensed by the consumer one at a time by un-rolling and tearing the perforation lines adjacent the bag handles. By placing nick portions in the tear lines across each bag handle at opposite sides, each handle may be torn from the adjacent bag by skewed tension. The ratio of non-cut vs. slit cut in a perforation line determines in-process perforation strength.

Referring to Fig. 7, an enlarged segment of the bag mouth portion 130 is depicted prior to removal of die-cut scrap 118. A minor bag mouth edge portion is provided centrally located between the opposing major smooth die-cut edge portions 131 between the bag handles for ease of separation. This minor bag mouth edge portion 130 comprises a perforation line having a uniform series of slits 136 of predetermined length (ie - about 0.5 to 2 cm.) and ratio (ie - 5:1 to 20:1) to alternating uncut land portions 138. The land portions 138 result in a spaced series of small tabs formed by tearing scrap thermoplastic film 118 from the die-cut bag mouth 130; thereby providing a series of torn film edge discontinuities in the perforated minor bag mouth edge portion to facilitate separation of blocked adjacent film layers during opening of the bag mouth.

Although the present invention has been described and exemplified with respect to preferred embodiments, it is to be understood that modifications and variations may be utilized without departing from the spirit and scope of this invention. Such modifications and variations are considered to be within the purview and scope of this invention.

CLAIMS:

1. A method for forming ungusseted handle-containing bags, comprising the steps of:

a) forming a continuous collapsed tube to provide multiple wall layers;

b) forming pairs of closely spaced seals transverse to said tube at bag length distances apart;

c) perforating a tear line to form a transverse line of weakness between each pair of seals;

d) folding marginal edges of said collapsed tube inwardly toward each other;

e) cutting and removing a cut-out region at one end of each sealed segment of the folded tube to define lateral loop handles and a bag mouth region in each bag, said bag mouth having opposing major inside smooth edge portions die-cut from adjacent bag walls formed by the collapsed tube of thermoplastic film and forming the inside edges of the lateral handles;

f) perforating a minor bag mouth edge portion centrally located between the opposing major inside smooth edge portions; and

g) tearing scrap thermoplastic film from the die-cut bag mouth said minor bag mouth edge portion to provide a rough edge along the torn central perforation line to facilitate separation of film layers in opening the bag mouth, thereby providing a series of torn film edge discontinuities in the perforated minor bag mouth edge portion to facilitate separation of blocked adjacent film layers during opening of the bag mouth.

2. The method of claim 1, wherein said continuous collapsed tube is produced by extruding a thin polymeric film material selected from the group consisting of low density

polyethylene, high density polyethylene, linear low density polyethylene and blends thereof.

3. A method for forming handle-containing bags in bag roll form from tubular thermoplastic polyolefin film comprising:

a) forming a continuous collapsed tube;

b) forming pairs of closely spaced seals transverse to said tube at bag length distances apart;

c) forming a perforated line of weakness between each pair of seals;

d) simultaneously or thereafter folding the marginal edges of said tube inwardly toward each other;

e) die-cutting and removing a bag mouth cut-out region at one end of each sealed segment of said tube so that on removal of said cut-out region, the die cut defining opposed lateral loop handles and a bag mouth in each bag; wherein a central bag mouth portion between lateral die-cut edges of the bag mouth is perforated by a notched die to form a short tear line;

f) removing the bag mouth cut-out region to provide a series of bag mouth edge discontinuities corresponding to the notched die to facilitate manual opening of the bag mouth; and

g) convolutely winding the bag roll structure to form severable bags in roll form.

4. In a roll of flexible thermoplastic bags for dispensing handled film bags from a rolled collapsed tube web having a series of individual bottom-sealed bags joined top-to-bottom by a transverse perforated tear line of film disposed between the bottom bag seal and a pair of lateral loop handles disposed on opposite sides of a U-shaped bag mouth, the improvement which comprises:

said bag mouth having opposing major inside edge portions die-cut from adjacent bag walls formed by the collapsed tube of thermoplastic film and forming the inside edges of the lateral handles; and

a minor bag mouth edge portion centrally located between the opposing major edge portions, said minor bag mouth edge portion comprising a torn perforation line formed by tearing scrap thermoplastic film from the die-cut bag mouth;

thereby providing a series of torn film edge discontinuities in the perforated minor bag mouth edge portion to facilitate separation of blocked adjacent film layers during opening of the bag mouth.

5. In a flexible thermoplastic bag having a pair of lateral loop handles disposed on opposite sides of a U-shaped bag mouth, the improvement which comprises:

said bag mouth having opposing major inside edge portions die-cut from adjacent bag walls formed by the collapsed tube of thermoplastic film and forming the inside edges of the lateral handles; and

a minor bag mouth edge portion centrally located between the opposing major edge portions, said minor bag mouth edge portion comprising a torn perforation line formed by tearing scrap thermoplastic film from the die-cut bag mouth;

thereby providing a series of torn film edge discontinuities in the perforated minor bag mouth edge portion to facilitate separation of blocked adjacent film layers during opening of the bag mouth.

FIG. 1

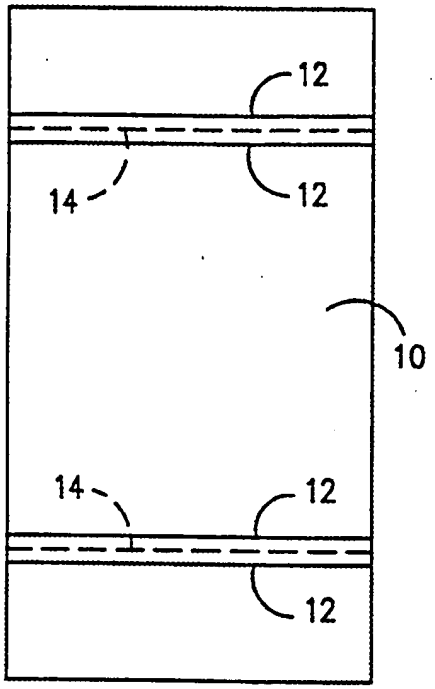


FIG. 2

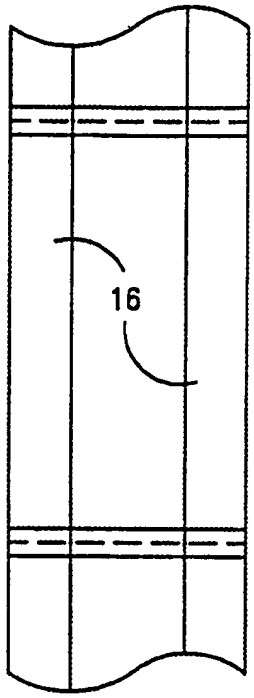


FIG. 3

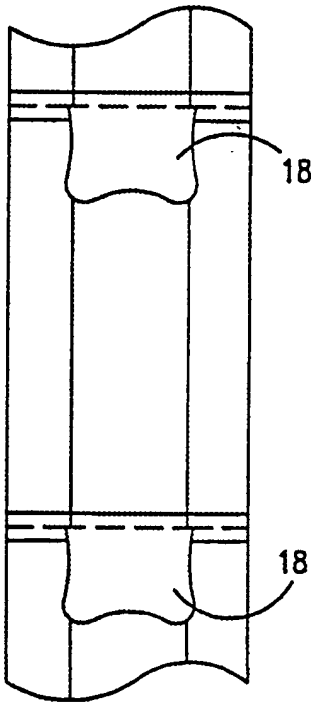
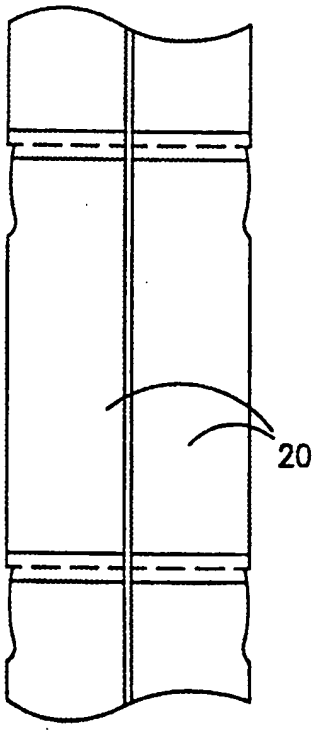


FIG. 4



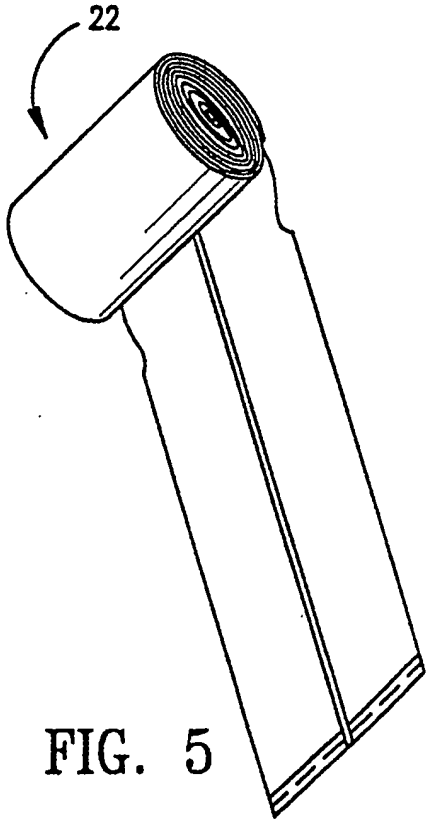


FIG. 5

FIG. 6

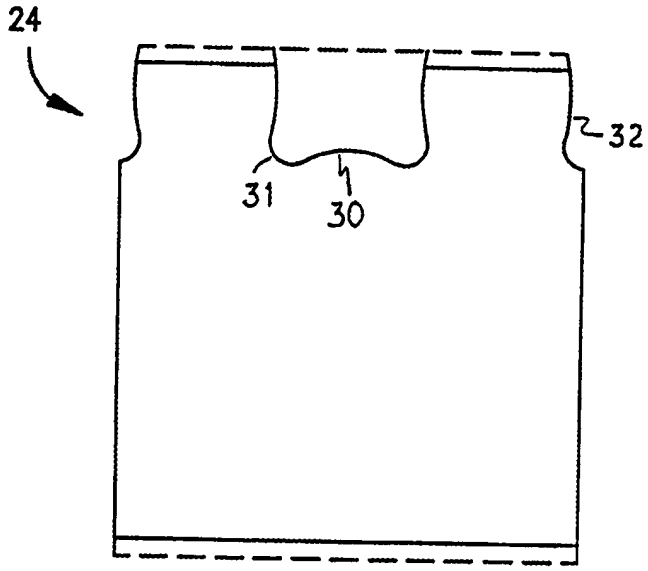
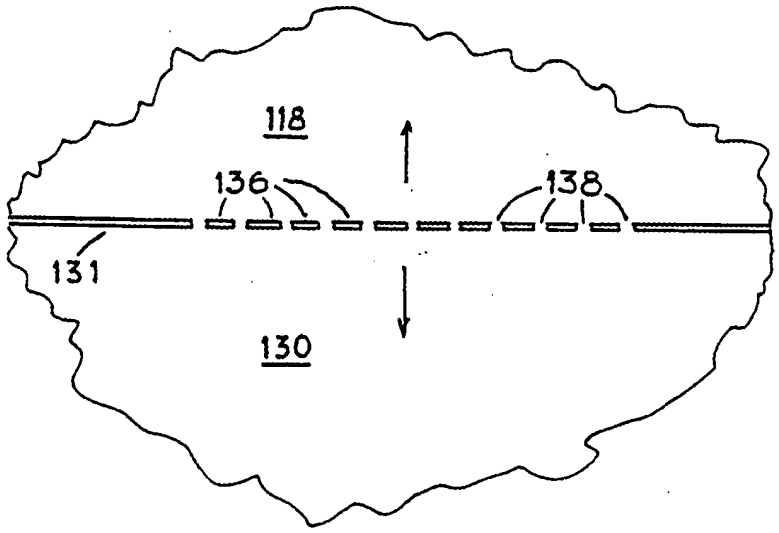


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/08000

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B31B 1/14, 1/64; B65D 33/10
US CL :383/8, 35, 37; 493/194, 226, 238
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 383/8, 35, 37; 493/194, 226, 238

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US, A, 5,056,931 (WILLIAMS) 15 October 1991, see col. 5, lines 8-42 and col. 8, lines 19-18.	5 --- 1-4
Y	EP, A, 433,689 (RIMONDI) 26 June 1991, see col. 1, lines 4-26.	1-4

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